C L A I M S

1. The cooling device (1) for a fuel-recirculation circuit from the injection system to the tank of a motor vehicle, which has a first opening (8) and a second opening (8) for connection to said recirculation circuit and comprises a pipe (2) having a side wall (5) and a finned radiant body (4) in a relationship of heat exchange with said pipe (2), said cooling device being characterized in that said pipe (2) is defined by a through cavity (3) of said radiant body (4) and in that it comprises guide means (7) for guiding the flow of fuel, said guide means (7) being housed in said pipe (2) in order to define at least one path of flow of said fuel adjacent to a side wall of said pipe (2).

2. The cooling device according to Claim 1, characterized in that said radiant body (4) comprises a plurality of fins (10) that are longitudinal with respect to said pipe (2).

3. The cooling device according to Claim 2, characterized in that said longitudinal fins (10) are arranged in spoke-like fashion with respect to said pipe (2).

4. The cooling device according to any one of the preceding claims, characterized in that said guide means (7) comprise an elongated body (14) inside said pipe (2).

5. The cooling device according to Claim 4, characterized in that said elongated body (14) is coaxial to said pipe (2).

6. The cooling device according to Claim 4 or Claim 5, characterized in that said elongated body (14) has at least one tapered end (11).

7. The cooling device according to one of Claims 4 to 6, characterized in that said elongated body (14) is made of polymeric material.

8. The cooling device according to one of Claims 4 to 7, characterized in that said elongated body (14) carries projections (15) in contact with said side wall (5) of said pipe (2), thus defining internal passages traversed by said fuel.

9. The cooling device according to one of Claims 4 to 7, characterized in that said pipe (2) carries projections (15) in contact with said elongated body (14), so defining internal passages traversed by said fuel.

10. The cooling device according to Claim 9, characterized in that said elongated body (14) has a circular cross section.

11. The cooling device according to one of Claims 8 to 10, characterized in that said projections (15) are helical.

12. The cooling device according to one of Claims 8 to 10, characterized in that said projections (15) are longitudinal.

13. The cooling device according to one of Claims 8 to 12, characterized in that said elongated body (14) is interference fitted in said cavity (3).

14. The cooling device according to any one of the preceding claims, characterized in that it comprises end couplings (6) connected hermetically to said pipe (2).

15. The cooling device according to Claim 14, characterized in that at least one coupling (6) comprises a substantially conical portion housing a respective end (11).

16. Method for manufacturing a cooling device (1) for a fuel-recirculation circuit from the injection system to the tank of a motor vehicle, which has a first opening (8) and a second opening (8) for connection to said recirculation circuit a

finned radiant body (4), a pipe (2) carried by said finned radiant body (4) in a relationship of heat exchange with said radiant body (4), and guide means (7) for guiding the flow of fuel, said guide means (7) being housed in said pipe (2) in order to define at least one path of flow of said fuel adjacent to a side wall of said pipe (2), said method being characterized by the fact of comprising the following steps:

- manufacturing said finned radiant body (4) by an extrusion process;
- mounting with an interference fitting said guide means (7) into said pipe (2);
- hermetically connecting to said pipe (2) a first and a second coupling (6) respectively defining said first and second opening (8).